



Advanced Ceramics Property Measurements

Jonathan Salem¹; John Helfinstine²; George Quinn³; and Stephen Gonczy⁴

¹. Mechanics and Life Prediction Branch, NASA GRC, Cleveland, OH; ². Corning Inc Retiree & Consultant, Big Flats, NY; ³. American Dental Association Foundation, NIST, Gaithersburg, MD; ⁴. Gateway Materials Technology, Inc., Mt. Prospect, IL

Introduction

Mechanical and physical properties of ceramic bodies can be difficult to measure correctly unless the proper techniques are used. The Advanced Ceramics Committee of ASTM, C-28, has developed dozens of consensus test standards and practices to measure various properties of a ceramic monolith, composite, or coating. The standards give the “what, how, how not, and why” for measurement of many mechanical, physical, thermal, and performance properties. Using these standards will provide accurate, reliable, and complete data for rigorous comparisons with other test results from your test lab, or another. The C-28 Committee has involved academics, producers, and users of ceramics to write and continually update more than 45 standards since the committee’s inception in 1986. Included in this poster is a pictogram of the C-28 standards and information on how to obtain individual copies with full details or the complete collection of standards in one volume.

For further information

The C28 Committee and Standards for Ceramics
ASTM C28 Committee Page =
<http://www.astm.org/COMMITTEE/C28.htm>

List of C28 Subcommittees and Links to Standards-
<http://www.astm.org/COMMIT/SUBCOMMIT/C28.htm>

ASTM C28 Advanced Ceramic Standards by Subject-
http://www.astm.org/COMMIT/C28_StdsBySubject.doc

Chart showing ASTM C28 Advanced Ceramic Standards-
http://www.astm.org/COMMIT/C28StandardsGraphic_2012_StandardsChart.pdf

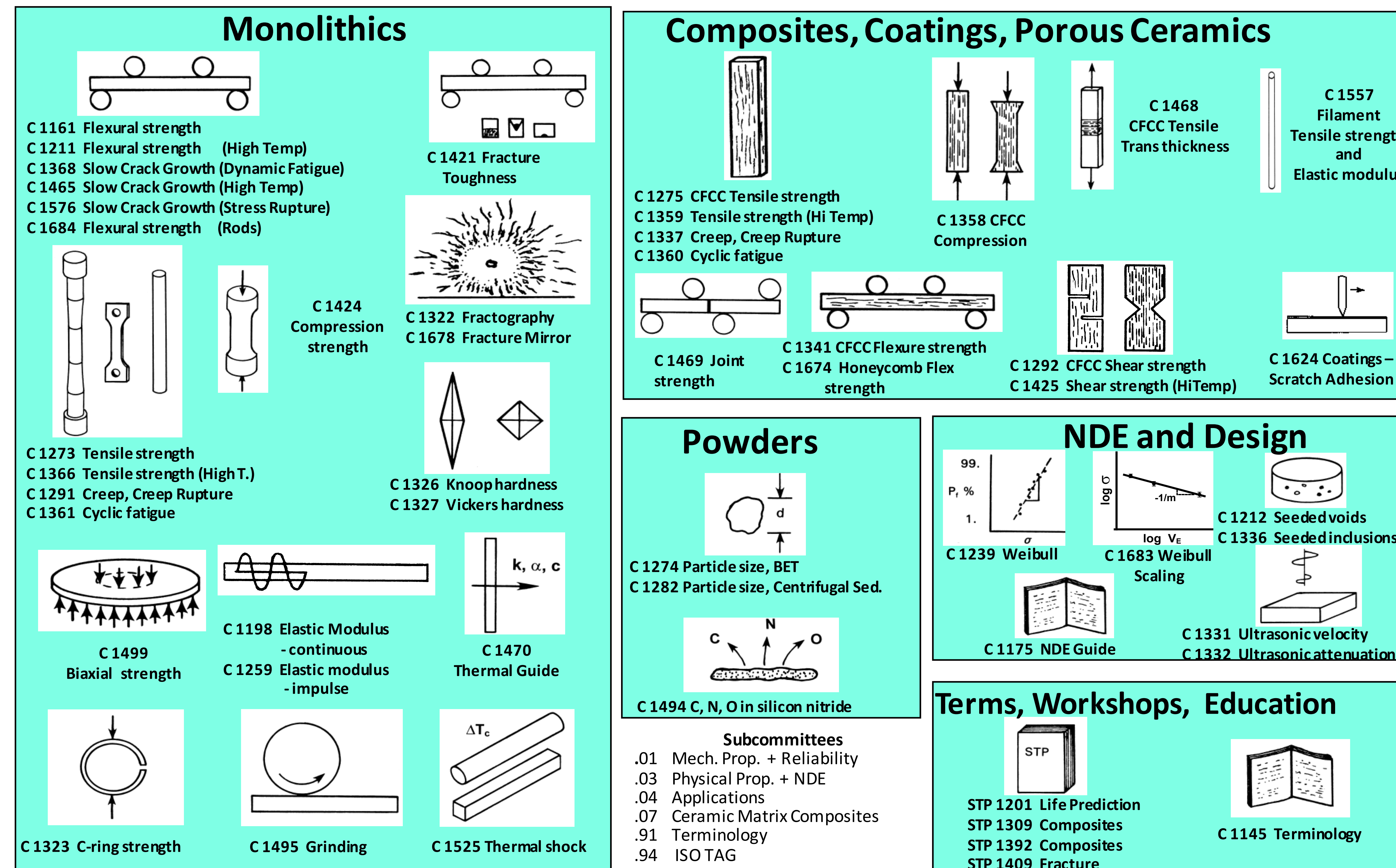
ASTM Standards for Advanced Ceramics, Whitewares, Glass, and Ceramic Tile-
<http://www.astm.org/Standards/glass-and-ceramic-standards.html>

Acknowledgments

We thank the more than 90 industry, government, and academic committee members from many countries (~25% non-USA) who have volunteered many hours to develop these standards via work in six technical and four administrative subcommittees.

C28 Advanced Ceramic Standards

Visit the C28 website (<http://www.astm.org/COMMIT/COMMITTEE/C28.htm>) to purchase C28 standards or join the C28 committee.



ASTM C28 standards are found in Vol. 15.01.

7-2010

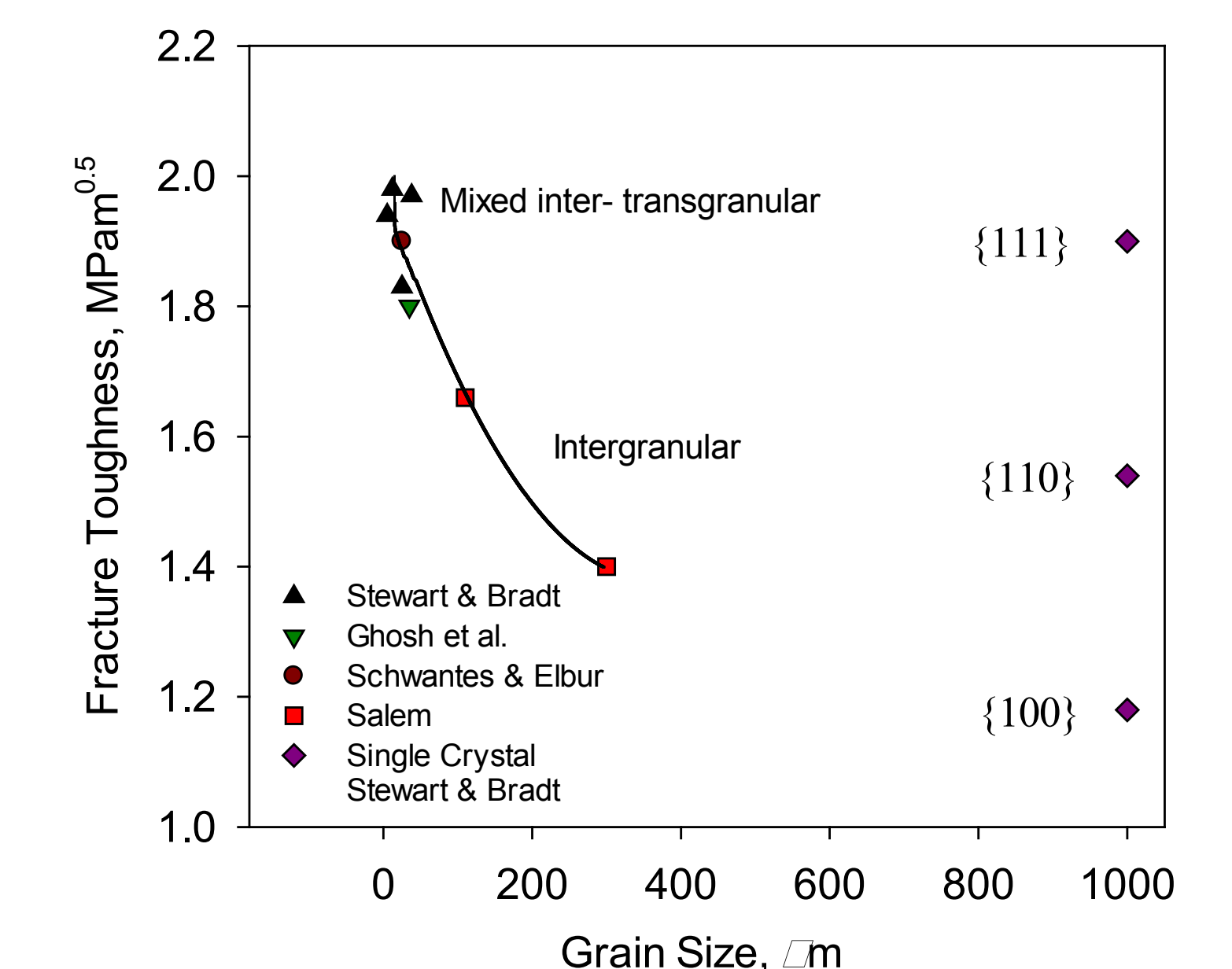
Standardization:

Tangible Benefits

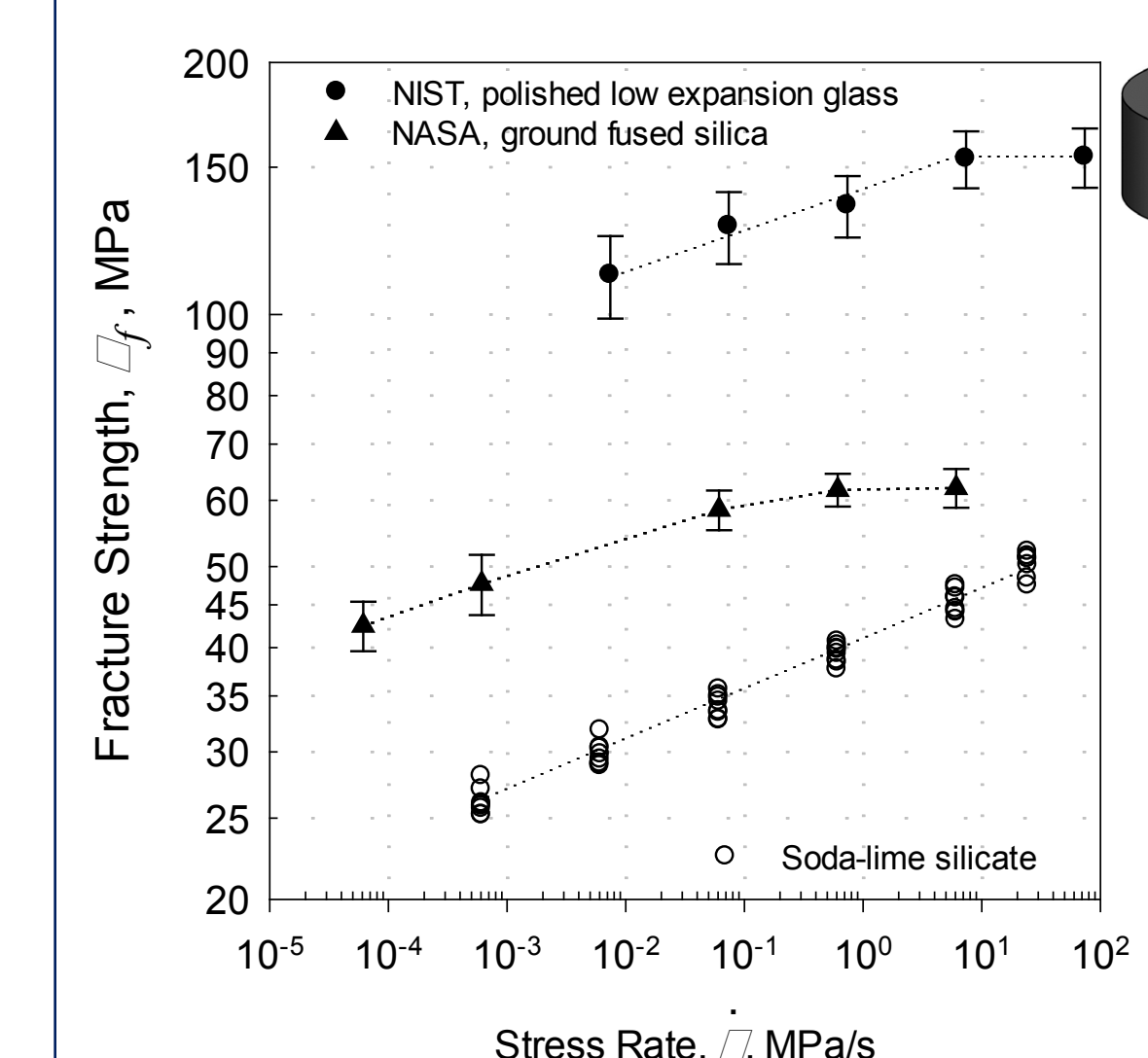
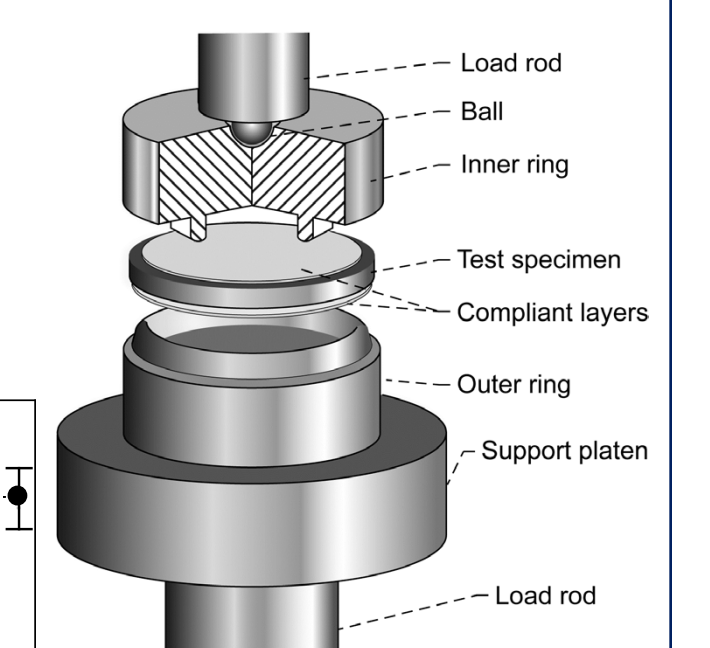
Comparisons Among Authors
And Helping to Interpret Data

The Problem:
**Transparent Armor Ceramics as
Spacecraft Windows***

● Standardized Fracture Toughness Tests (C1421) insure correct comparisons of different authors' results --



● Standard sized circular disks could be used to determine Poisson's ratio and Young's modulus via C1259 and biaxial strength via C1499 as well as the slow crack growth parameters, n and A, via C1368. This allowed efficient understanding of the behavior of the material.



*J.A. Salem, J.Am.Ceram.Soc., 96[1] 281-289 (2013)

Standardization: Tangible Benefits

F 1973: Standard Specification for High Purity Dense Yttria Tetragonal Zirconium Oxide Polycrystal (Y-TZP) for Surgical Implant Applications

ASTM Committee F-04, Surgical and Medical Devices and the U.S. Food and Drug Administration used generic C-28 Advanced Ceramics for their new standard

“The average flexural strength shall be 800 MPa or greater by 4 point bending in accordance with ASTM C 1161”
“The minimum elastic modulus shall be 200 GPa in accordance with C 1198 or C 1259”
“If Weibull modulus is tested, it shall be tested in accordance with C 1239”

